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ABSTRACT

This paper argues that due to the facts of accent shift, Japanese accent should itself be interpreted as pitch rather than as a diacritic on the basis of which pitch patterns are imposed by rule. The solution offered is tentative and concerns only Tokyo Japanese. It is suggested that consideration of accent in non-Tokyo dialects will strengthen the view that Japanese accent should be interpreted directly as pitch. (JL)

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SOME ISSUES IN JAPANESE ACCENT*

Kenneth L. Miner

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Abstract: Previous treatments of Japanese accent have regarded accent as a diacritic feature on the basis of which pitch patterns are predicted by general rules. I will show here that there are reasons for regarding pitch as inherently present in Japanese words, and will offer a tentative analysis founded on this assumption.

Introduction

Against all previous theoretical work on Tokyo Japanese accent, Pierrehumbert & Beckman 1988 argue on the basis of their phonetic investigations that Japanese words and longer accentual domains do not show tone spread; that is, in their analysis it is not the case that all moras are assigned a surface H or L pitch. Instead, at surface level only three or four moras in a word are specified for tone, the surface pitch of the remaining moras following from phonetic transitions between target values for the assigned tones.

Although, as I will point out, the overall position of Pierrehumbert & Beckman appears to be incompatible with the phonological effects of accent in Japanese--in particular the interaction of accent with vowel devoicing and the accentual behavior of verbal suffixes and post-nominal particles, as treated for example in McCawley 1977 and Haraguchi 1977 and summarized in Vance (1987)--I believe they are on the right track in seeing Japanese accent not as manifested in terms of pitch, but as pitch. That is: previous work on Japanese accent has taken accent itself to consist of the lexical marking of a particular syllable of each accented word (graphically represented by, say, an asterisk). General rules then impose a pitch contour on a word or larger domain with reference to this accent. What Pierrehumbert & Beckman have done is to suggest that accent in Japanese is lexically assigned tone, rather than tonal patterns imposed by general rules referring to an independent lexical accent.

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Kansas Working Papers in Linguistics, Volume 17, Number 1, 1992, pp. 1-24

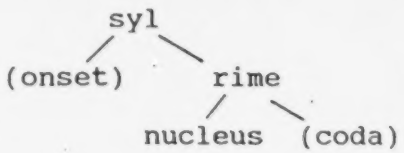
I believe, and will attempt to show, that such a revision in our conception of Japanese accent is motivated by the phenomenon of floating accent.

The purpose of this paper is to determine what is required to implement such a view of Tokyo Japanese accent.

Many of my examples are from Haraguchi (1977), McCawley (1977), and Vance (1987).

The data

The Japanese syllable (evidence that both syllable and mora are phonological units in Japanese is extensively reviewed and supplemented by Vance (1987) can be represented in the familiar way as follows (parenthesized constituents are optionally present):



The onset may be a consonant or zero (unless we take word-initial glottal stop to be systematic, in which case the onset is obligatory; see Vance 1987, § 4.10, for some discussion of this issue), the nucleus is a vocalic mora, and the coda if present is another vocalic mora, the mora nasal /N/, or the mora obstruent /Q/. (For our purposes the mora nasal can be regarded as an allophone of /n/ which occurs only in codas while other allophones of /n/ occur only in onsets, and the mora obstruent can be seen as the first half of a geminated consonant pair; for details see the comprehensive summary in Vance 1987.) Only the syllable nucleus may be accented (except as a result of the docking of a floating accent, on which see below).

The traditional account of Tokyo Japanese surface accent is as follows:

Accent is assigned to the nuclei of syllables, but pitch is superficially realized on all moras. A word may be accented on one (and only one) of its syllables, in which case the nucleus of the syllable carries the accent; or a word may be unaccented:

(1) *mákura* 'pillow'
kokóro 'heart'
takará 'treasure'
sakana 'fish' (unaccented)
kóokoo 'filial piety'
kookoo 'high school' (unaccented)

An unaccented short word-initial mora is low; all subsequent moras from left to right are high until an accented nucleus, if any, is reached, following which there is a fall. The resulting patterns for the first five items in (1) are therefore as in (2).

(2)
```
  H   L   L
m a k u r a

  L   H   L
k o k o r o

  L   L   H
t a k a r a

  L   H   H
s a k a n a

  H L   L L
k o o k o o    'filial piety'
```

If a word-initial syllable is long and unaccented, as in the last item in (1), or in *senséi* 'teacher', "some standard speakers [first variety-KM] pronounce it LH, but others [second variety-KM] pronounce it HH" (Vance 1987:80). In the first variety, not only does a <u>short</u> unaccented word-initial syllable take an automatic low, as seen in the above examples, but the first mora of a <u>long</u> unaccented word-initial syllable also takes an automatic low:

```
  L H   H H
k o o k o o    'high school'  ┐
                               ├ (variety 1)
  L H   H L                    │
s e n s e i    'teacher'       ┘
```

In the second variety (favored by younger speakers; McCawley 1977:262), such a syllable is high throughout:

H H H H		
k o o k o o	'high school'	} (variety 2)
H H H L		
s e n s e i	'teacher'	

An unaccented disyllable such as *hasi* 'edge' and a disyllable with accent on the second syllable such as *hasí* 'bridge' have, in isolation, the same tonal pattern, as in (3).

(3)

L H	
h a s i	'edge'
L H	
h a s i	'bridge'

However if an unaccented particle such as *wa* (topic marker) follows, the difference shows up in the expected drop in pitch after the accent in the case of the second item, as in (4).

(4)

L H H	
h a s i w a	'edge (topic)'
L H L	
h a s i w a	'bridge (topic)'

From what has been said so far, we might expect the items in (5) to have the same tonal pattern, namely, LHHL.

(5)

butá káu	'raise pigs'
sizensyúgi	'naturalism'

However there is in the case of the first item a drop after the accented final syllable of *butá*, that is, after the first H, before the second H begins; in the case of the second item, this drop is absent. Thus sequences like *butá káu* "sound distinctly like two accentual phrases" (Pierrehumbert & Beckman 1988:10).

Particles following nouns may create accentual domains longer than the word; patterns of accent within these domains differ depending on the particular particle (McCawley 1977:264). Some, like *wa* (topic marker) mentioned above, merely have the low pitch predicted by the general accent principles mentioned above (cf. (4)). Some, like *nado* 'and so on' and *kara* 'from' seem to have their own accent when following an

unaccented word, *nado* on its first syllable and *kara* on its second syllable (in order to show this for *kara* I give examples below with *kara wa*), but when following an accented word, they lose this independent accent:

(6)
L H L L L
k o k o r o n a d o

L H H H L
s a k a n a n a d o

L H L L L L
k o k o r o k a r a w a

L H H H H L
s a k a n a k a r a w a

One type, which McCawley (loc.cit.) refers to as "preaccented", seems to impose a final accent on a preceding normally unaccented noun, but when following an accented noun, shows no such behavior. Such a particle is *sika* 'only':

(7)
L H L L L
k o k o r o s i k a

L L H L L
s a k a n a s i k a

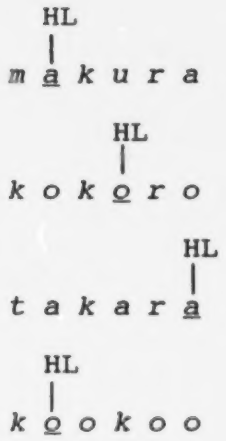
The question of how to account for this apparent accent shift will be a major topic to be treated below.

Haraguchi's autosegmental analysis

The essence of Haraguchi's solution (very similar to the non-autosegmental analysis of McCawley 1977) is as follows:

All Japanese words and larger domains of accent manifest a single HL tone pattern or melody. The H of this pattern is associated with the first lexically accented mora if any (which I will indicate by underlining), as in (8) (below we will deal with domains in which more than one accent occurs).

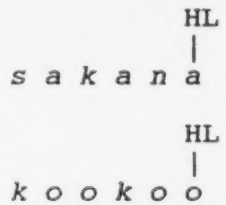
(8)



'filial piety'

If the word is unaccented, the H is associated with last mora in the word by default, as in (9).

(9)



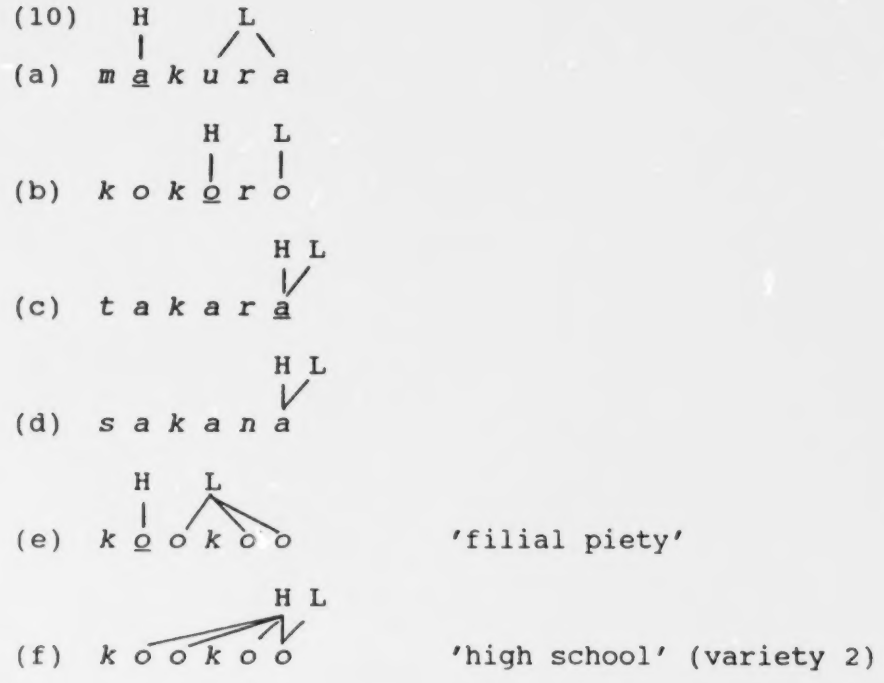
'high school'

Tone association then follows as per the Association Convention; an adaptation of the wording of Goldsmith 1990:14 is as good a version as any for our purposes (cf. Haraguchi 1977:10-12; Vance 1987:94):

> Association Convention
>
> When unassociated tone-bearing elements [here moras-KM] appear on the same side of an association line, they will be automatically associated in a one-to-one fashion, radiating outward from the association line.

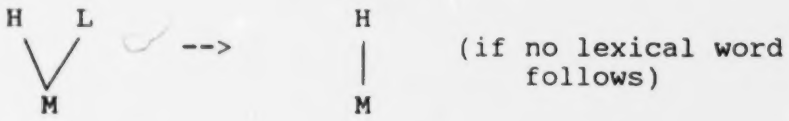
Thus we have the associations in (10). (Word-initial unaccented short syllables are here taken to be extratonal; see immediately below.)

(10)



If a lexical word follows one of the final HL contours, it remains, as we have seen in the discussion of (5) above. For the remaining cases, Haraguchi posits a Tone Simplification rule as follows (where M = mora):

(11) Tone Simplification

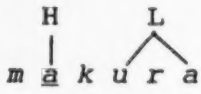


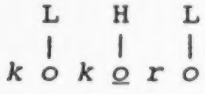
(if no lexical word follows)

Haraguchi also posits a special rule of Initial Lowering to lower a word-initial H if followed by a H; however I see no reason why we cannot simply claim that word-initial unaccented short syllables are permanently extratonal, with a default to low. Thus a H will not spread to them in the first place, either from the HL associated with an accented syllable or from the default H of unaccented words. Variety 1 speakers apply this rule to an initial mora, while Variety 2 speakers apply it to an initial syllable, which is why there is a difference between the two varieties for unaccented words with long initial syllables, such as *kookoo* 'high school' and *sensei* 'teacher.'

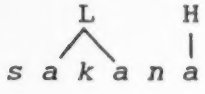
After these rules and the default to low for extratonal syllables have applied, we have, for words in pre-pause position, the surface tonal patterns desired, as in (12).

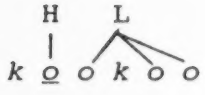
(12)

(a) 

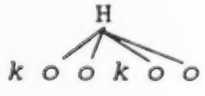
(b) 

(c)

(d) 

(e) 

'filial piety'

(f) 

'high school' (var 2)

If a lexical word follows, words like (c) and (d) will retain their contour, not undergoing (11), and "unaccented" words like (d) and (f) will allow their H to spread rightward to the next H.

The Analysis of Pierrehumbert & Beckman 1988

Pierrehumbert & Beckman 1988 examined fundamental frequency variation in phrases such as those in (13), placed in a textual frame.

(13) *moriya no mawari no omáwarisan*

'the policeman of the Forrests' neighborhood'

moriya no mawari no yoozinboo

'the watchman of the Forrests' neighborhood'

These phrases are predicted by Haraguchi's analysis to have a rather long stretch of H tones between the first

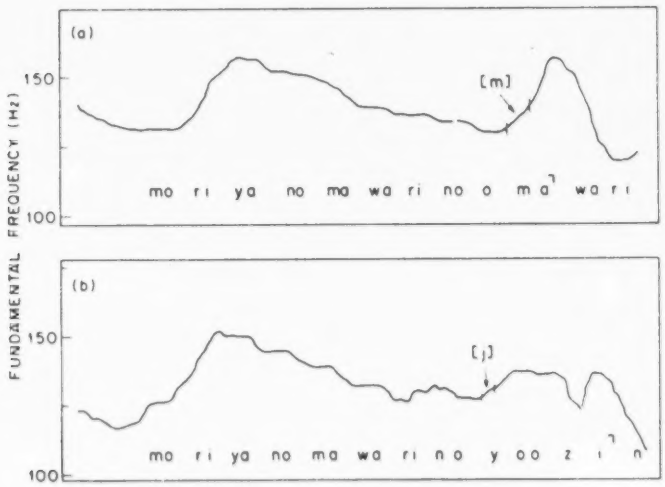
ri and the accent. For example the first phrase, in which *moriya no* and *mawari no* form a single NP and thus a single accentual domain, is predicted to surface with the following tonal pattern:

L H H H H H H H L H L L L L

m o r i y a n o m a w a r i n o o m a w a r i s a n

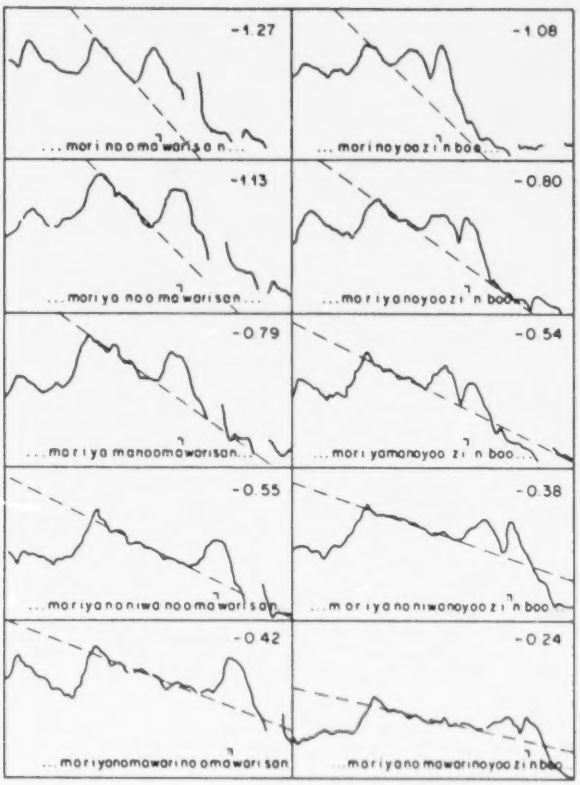
An F_0 tracing for this phrase (Pierrehumbert & Beckman 1988:27) is shown in (14).

(14)



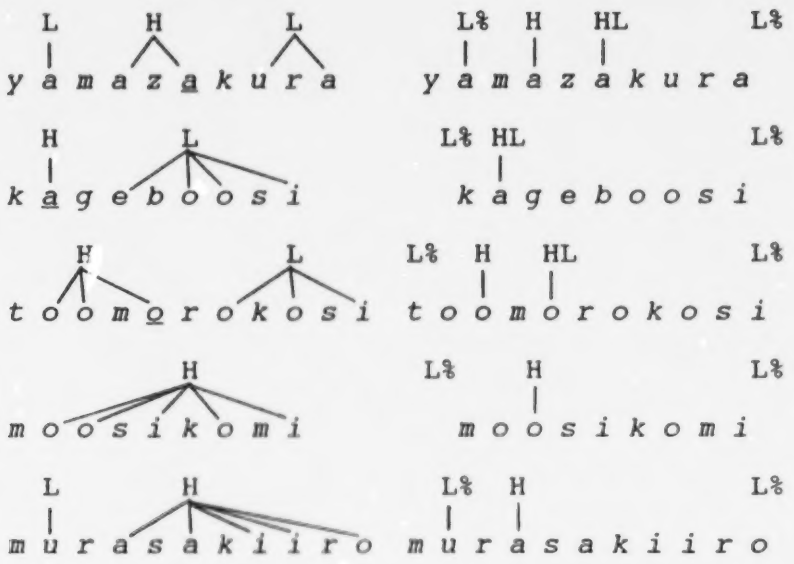
Note the expected rise on the second syllable of the phrase, and the expected rise from low to high on the first two syllables of *omawarisan*; however note also that there is a decline throughout the sequence of H tones postulated by Haraguchi's analysis. According to Pierrehumbert & Beckman, this cannot be mere downdrift (declination) if we assume a linear declination model, because study of phrases of varying length show that the decline in F_0 is steeper the <u>shorter</u> the distance between H tones, while if declination is linear we should find steeper declination the <u>longer</u> the distance between highs. Examples of their F_0 tracings of these longer phrases are given in (15).

(15)



The authors reject an exponential declination model (which would account for these facts: one would simply say that Japanese has "steep downdrift") and conclude that there are far fewer surface tones than moras (that is, some surface moras are unspecified for tone); note the items in (16) with surface patterns as claimed by Haraguchi and as claimed by Pierrehumbert & Beckman (the examples are *yamazákura* 'wild cherry,' *kágeboosi* 'shadow,' *toomórokosi* 'corn,' *moosikomi* 'proposal,' and *murasakiiro* 'purple.')

(16) Haraguchi: P & B:


L H L
y a m a z a k u r a
L% H HL L%
y a m a z a k u r a
H L
k a g e b o o s i
L% HL L%
k a g e b o o s i
H L
t o o m o r o k o s i
L% H HL L%
t o o m o r o k o s i
H
m o o s i k o m i
L% H L%
m o o s i k o m i
L H
m u r a s a k i i r o
L% H L%
m u r a s a k i i r o

Pierrehumbert & Beckman's HL goes on accented syllables if any, as in the autosegmental treatment; and a H goes on an unaccented second mora. Every word has a final boundary tone, L%, which in the case of a following word with an unaccented initial mora associates with that mora; thus the words above (which are taken to be in context) are shown with both initial and final L% boundary tones. Unlike in a tone-spreading analysis, where each mora eventually comes to have a surface tone, these are the only surface tones posited in the Pierrehumbert & Beckman analysis.

Some relevant phonological phenomena

As mentioned in the beginning, I believe Pierrehumbert & Beckman have opened the door to a better analysis of Japanese accent by interpreting accent directly as pitch. However, their account, if taken as a phonological analysis, is obviously incompatible with a tone-spreading analysis along the lines of Haraguchi (1977), which is required in order to explain the accent patterns resulting from the devoicing of high vowels and from the behavior of certain particles. I will discuss each of these in turn.

Vowel devoicing and accent shift

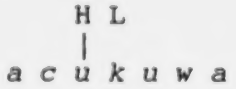
As is well-known, the Japanese high vowels /i/ and

/u/ devoice (and even disappear) in the neighborhood of voiceless obstruents at normal conversational tempos. Though there has been disagreement about the devoicing of accentable vowels, it seems clear that sometimes and for some speakers devoiced vowels remain accented (though in that case their phonetic realization is unclear), while in other cases the accent shifts to a different syllable when an accented vowel is devoiced (see Vance 1987, Chapter 6 for discussion). The question of predicting the direction of accent shift then arises. It turns out that Haraguchi's autosegmental approach is quite successful in accounting for the shifts which seem typical. (Note that whereas in many cases one can explain the direction of accent shift upon loss, devoicing or gliding of vowels by positing metrical feet, as in Halle & Vergnaud 1987, in Japanese there is no evidence whatever for metrical feet. In addition, as we shall see, accent may shift in either direction in Japanese.)

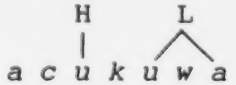
Right-shifted Accent

Haraguchi gives his derivation of the adverbial form of *acuí* 'thick' followed by *wa* (topic marker). The adverbial suffix *-ku* regularly places accent on the preceding syllable: *acúku wa*. After devoicing we have *acu̥kú wa*. Haraguchi's derivation is as in (17).

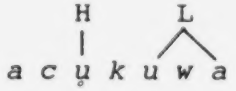
(17) Tone Assignment



Association

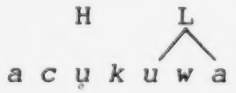


Devoicing

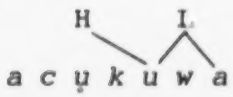


Haraguchi posits a straightforward Erasure Convention which deletes an association line between a tone and an element that has lost its ability to bear a tone:

Erasure

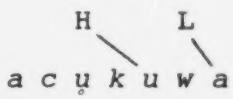


Needless to say, the prediction is that the unassociated H will associate rightward:

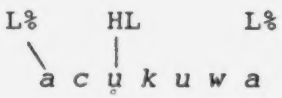


(Actually, rightward association of the stranded H in Haraguchi's analysis has to be specified; in mine it does not: the H is not associated to the left because that mora is extratonal.)

Finally, the previously motivated Tone Simplification applies:



Consider this phrase in terms of the analysis of Pierrehumbert & Beckman. The surface tonal specifications are:



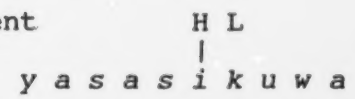
In such an analysis the right-shifted high, rather than following from general principles, would have to be handled by a special rule.

The ability of the autosegmental approach to resolve accent shift on a principled (and phonological) basis is even clearer in the case of leftward accent shift.

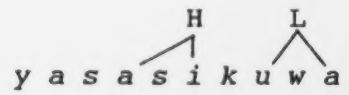
Left-shifted Accent

If the adverbial suffix *-ku* is attached to a longer adjective, such as *yasasii* 'easy', the accent appears one syllable earlier than required by *-ku*: we get *yasásu̥ku wa*. Haraguchi's analysis (but without Initial Lowering) goes as follows:

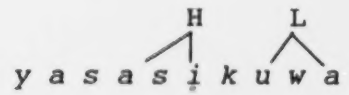
(18) Tone Assignment



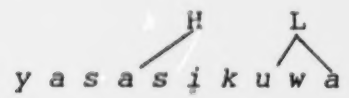
Association



Devoicing

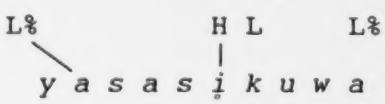


Erasure



Here there is no stranded tone and the perceived H on the syllable preceding the devoiced syllable follows automatically. Vance remarks (1987:98) that "Haraguchi does not explain why speakers interpret the unassociated /si/ as L, but presumably they simply interpret every mora after the last H as L." Another way of securing this effect is to posit L as the default tone assignment (see above, discussion of (12).

Consider the tonal specifications of Pierrehumbert & Beckman for this item:



Since they argue that there is no tone spreading, there is no reason why the syllable preceding the one with the devoiced vowel should be phonologically high.

The behavior of particles

The assumption of tone spreading accounts for the behavior of the particles *nado* 'and the like' and *kara* 'from' mentioned above.

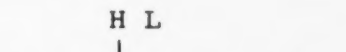
The behavior of *nado*

As described earlier, when *nado* follows an accented noun, the accent of the noun appears; but when *nado* follows an unaccented noun, accent comes on the first syllable of the particle:

mákura 'pillow'	*mákura nado*
kokóro 'heart'	*kokóro nado*
takará 'treasure'	*takará nado*
sakana 'fish'	*sakana nádo*

These facts are accounted for in an autosegmental treatment if *nado* has inherent accent on its first syllable, and if N + *nado* constitute an accentual domain (which means that a single HL melody will be assigned to the phrase); its H will be assigned to the first accented syllable (as usual I mark inherent accent by underlining the accented mora):

Tone Assignment

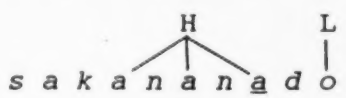


Association

Tone spreading of the L has the desired effect. If the noun on the other hand is unaccented, we have:

Tone Assignment

Association



Here again we have the desired result. Note that in the first example it is the tone spreading of the L tone to the right that takes precedence over the inherent accent on *nado;* where this L does not spread--as in the second example--that accent appears.

The particle *made*, which also follows nouns, behaves exactly like *nado* in having inherent accent on its first syllable; *-(r)eba* (conditional) also behaves this way except that it is attached to verbs rather than nouns; see Vance 1987:87 and McCawley 1977: 263-4 for discussion.

The behavior of *kara*

As we have seen earlier, the particle *kara* 'from'

behaves similarly to *nado* except that it has an inherent accent on its second syllable: when *kara* follows an accented noun, the accent of the noun appears; when it follows an unaccented noun, it has its own accent on its second syllable: if we take *kara* to have inherent accent on its second syllable, the L-spread will override this accent in the case of accented words, but leave it unaffected in the case of unaccented words. Thus for an accent word followed by *kara* we have:

Tone Assignment

Association

But for an unaccented word we have:

Tone Assignment

Association

Tone Simplification (if no lexical word follows)

The Implications of Shifted Accent

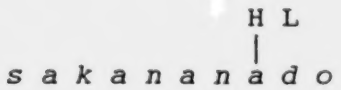
Some particles, such as *sika* 'only', behave like those discussed above when attached to an accented word, in that they then allow that word to retain its accent; but when following an unaccented word, they impose an accent on the final mora of that word:

kokóro sika 'only heart'

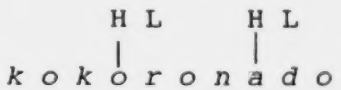
sakaná sika 'only fish'

The accent pattern of *sakana + sika* thus comes to be identical with that of *takara + sika*, where *takara* has an inherent accent on its final syllable.

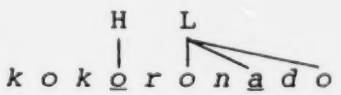
This creates an interesting challenge to autosegmental phonology. Recall that the traditional analysis of Japanese accent does not claim that a word accent consists of a HL tone assignment. If we were claiming that, we would be saying that HL is underlyingly associated with a syllable; this would have the consequence that underlyingly *sakana nado*, for example, is



but *kokoro nado* is underlyingly:



This would require us to posit a special rule to the effect that the leftmost HL displaces all HL to its right. What we want however is to say that only one HL is assigned to the string, and its L spreads to the right:



In other words, we have been claiming that Japanese accent is in essence a lexical diacritic on specific syllables (indicated above by underlining them), and that within a given accentual domain the H of the unique HL is associated with the first syllable in the accentual domain thus marked.

But if accent itself can float, it would seem that accent is on a tier of its own. Thus the kind of representation we want, it seems, for *sakana + sika* is, prior to Tone Assignment,

H L (tonal tier)

s a k a n a s i k a

A (accentual tier)

This would allow us to represent the accent of *sika* as docking (via some appropriate rule) to the left if no accent blocks it:

H L (tonal tier)

s a k a n a s i k a

A (accentual tier)

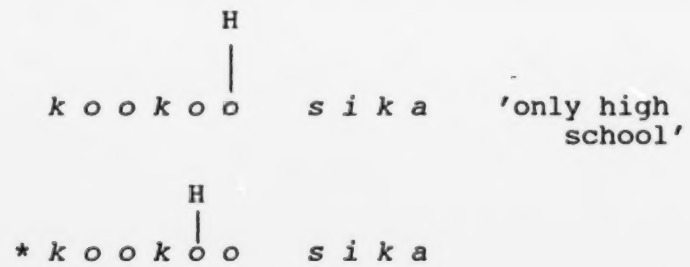
After this docking, Tone Assignment and Association would proceed normally:

However, positing an accentual tier for Japanese seems highly undesirable. Unlike normal autosegments, accent is realized on only one unit on the segmental tier: processes like spreading, for example, that normally apply to bring about one-to-many relations between units on different tiers, do not apply to accent.

As we have seen, traditional analyses have assumed that Japanese accent is a diacritic. This assumption has seemed attractively simple: a single syllable of each accented word "carries the accent" and general rules interpret it. There is however also the possibility of interpreting accent directly as pitch (as do Pierrehumbert & Beckman 1988); since such an analysis would remove the need for an independent diacritic of accent, it would seem also to have a certain simplicity.

It seems to me there are at least four arguments for such a solution:

(a) When *sika* 'only' follows an unaccented word which happens to end in a long syllable, *sika* imposes a high pitch on the second mora of that long syllable:



It is well-understood (cf. Vance 1987:65) that accent goes on the first mora of a syllable; the second moras of syllables never bear accent. Therefore it is really not proper to say that *sika* imposes an accent on a preceding unaccented word: it simply imposes a H. The process is reminiscent of floating tone.

(b) No other language has been found to behave like Japanese as traditionally analyzed.

(c) The analysis of accent directly as pitch makes it possible to account for the facts of "accent shift" without either putting accent on its own tier or assuming deletion of an HL by another HL. (This will be shown in the next section.)

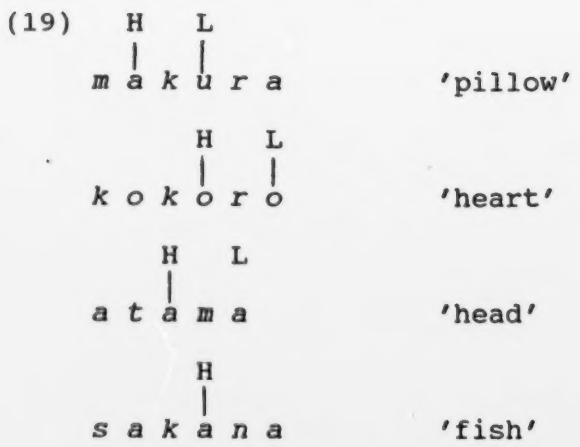
(d) In the traditional analysis some lexical words are unaccented, but, as McCawley points out (1977:264), there are no particles which have to be treated as unaccented. In an analysis in which accent is seen simply as pitch, there are no "unaccented" lexical words, removing the difference between lexical words and particles necessitated by the traditional analysis.

I will now describe such a solution and establish argument (c).

A Solution With Underlying Pitch

In this solution a syllable lexically may be assigned a H, a L, or no tone, and tones may or may not be lexically associated. Accent is regarded as a lexical pattern of H possibly followed by a L; lexical entries of various shapes would be as in (19).

(19)



Assuming that pitch is underlying for Tokyo Japanese requires that words having the pattern of *mákura* have an underlying H on the first syllable. If we posit a L on the following syllable, it will properly spread rightward as far as possible. The situation is analogous for words having the pattern of *kokóro*: the fact that the first mora is L is guaranteed by its extratonality (see above, discussion of (12) and (18)).

For words of the pattern of *atamá* on the other hand, we must guarantee that the second and third syllables are H. This can be done by positing an underlying unassociated L to the right of the H. The H must spread to the right (see Tone Spread below), and the unassociated L must dock to the right if possible, and if not, remain to give the final HL contour.

The most radical departure suggested here is the treatment of words like *sakana* which have traditionally been regarded as "unaccented." Note that they actually surface, in isolation, with a pattern like that of *atamá*: the difference between *sakana* and *atamá* is that there is no drop after *sakana*. I am suggesting that the difference is the presence, in *atamá*, versus the absence, in *sakana*, of the unassociated L. In this analysis, all words are accented, both lexical words and particles (cf. McCawley 1977.264).

As mentioned, an unassociated word-initial short syllable is extratonal. The major rules required are as in (20):

(20) Major Rules

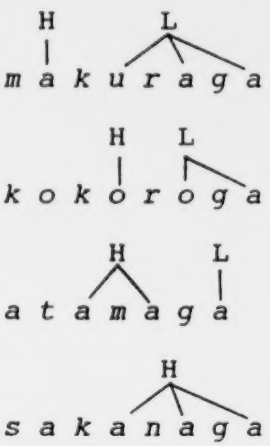
High Tone Deletion A high tone drops after a preceding word containing a H.

L-Docking An unassociated L docks to the right if possible (i.e., if a word follows having an initial unassociated syllable.) Otherwise, if a word follows, the L docks to the same vowel as the H preceding it (cf. Vance 1987:105 where the presence of these final contour tones is contested; but cf. also Pierrehumbert & Beckman 1988 passim which supports them; cf. also (5) above and the subsequent discussion); and if no word follows, there is instead an application of a rule of Tone Simplification, as in the analysis of Haraguchi (1977)). See below for all of these cases exemplified.

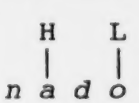
Tone Spread All tones spread to the right.

When the above examples are followed by *ga* High Tone Deletion rule is not applicable; after L-Docking and Tone Spread we have the results shown in (21).

(21)

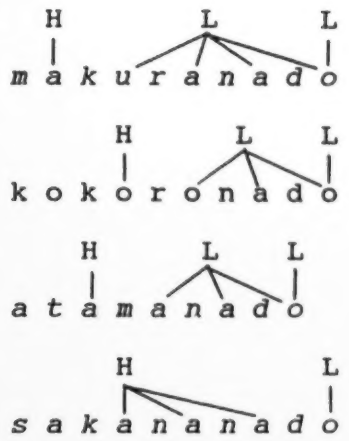


When these same nouns are followed by *nado*, we see the effect of High Tone Deletion; *nado* has an inherent H on its first syllable and a L on its second syllable:

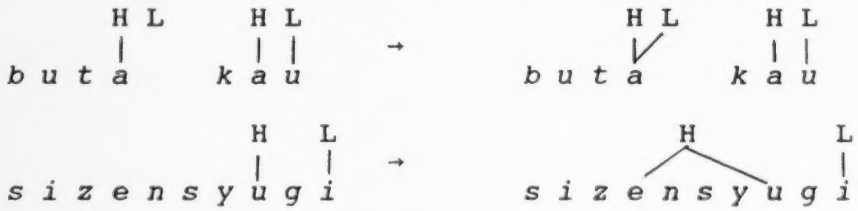


After High Tone Deletion and Tone Spread we have:

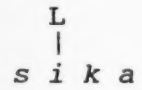
(22)



Note that the distinction between, e.g., *butá káu* and *sizensyúgi* (see (5) above) is maintained in this analysis. These will have the following derivations:

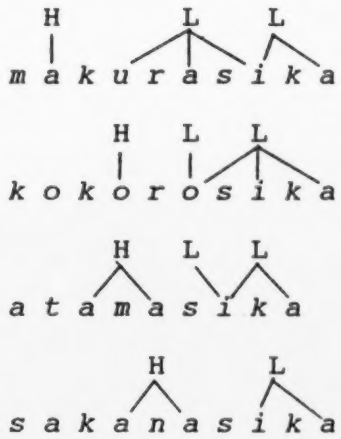


The most interesting particle is the one that "shifts its accent," *sika*. Assume *sika* is lexically low-toned on its first syllable:



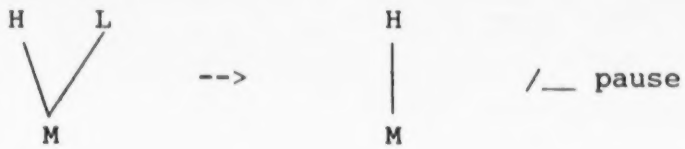
L-Docking and Tone Spread give the results shown in (23).

(23)



Finally, the rules in (20) include a rule essentially identical to Haraguchi's Tone Simplification (Haraguchi 1977:18; Vance 1987:96). This rule removes a HL contour from words having (in traditional terms) final-syllable accent if no word follows:

(24) Tone Simplification



Thus:

Conclusion

I have argued, taking a cue from Pierrehumbert & Beckman 1988, that due to the facts of accent shift, Japanese accent should itself be interpreted as pitch, rather than as a diacritic on the basis of which pitch patterns are imposed by rule. The solution offered here is (a) tentative and (b) concerns only Tokyo Japanese. However I believe that consideration of accent in non-Tokyo dialects will strengthen the view that Japanese accent should be interpreted directly as pitch.

NOTES

* I appreciate the comments of Akira Yayamoto on an earlier draft of this paper. All errors are mine.

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